

# **Dual-Core Intel® Itanium® 2 Processors Deliver Unbeatable Flexibility and Performance to the Enterprise**

Robert Shiveley



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## Dual-Core Intel® Itanium® 2 Processors Deliver Unbeatable Flexibility and Performance to the Enterprise

### **Overview: Hitting New Heights of Performance, Scalability, and Availability**

New Dual-Core Intel® Itanium® 2 processors offer a dramatic price-performance improvement over proprietary legacy RISC and mainframe-based systems. Widely available servers based on these new processors enable enterprise IT to achieve higher levels of performance, scalability, and availability at a fraction of the price of expensive proprietary computing architectures.

Dual-Core Itanium 2 processors represent a significant leap forward for Intel's highest-performing and most reliable server processor family. With more than 1.7 billion transistors, the Itanium 2 processor is one of the most ambitious chips ever built. And with two execution cores, these processors double the performance of previous Itanium processors while reducing average power consumption from 130 watts to about 100 watts. That means 2.5 times better performance per watt, helping to lower power and cooling costs. In addition, Dual-Core Itanium 2 processor-based systems include silicon-level support for virtualization and new reliability, availability, and serviceability (RAS) features that help IT organizations improve manageability and uptime.



For IT organizations challenged by the high cost and limitations of RISC architectures, new Dual-Core Itanium 2 processor-based systems offer an industry standards-based model for enterprise-critical computing with unparalleled freedom of choice and a roadmap that ensures long-term support. The Intel platform offers the flexibility to choose from a variety of operating systems, dozens of hardware vendors, thousands of applications, and a large community of independent solution providers.

### **Dual-Core Processing Furthers Itanium 2 Performance and Cost Benefits**

The Dual-Core Itanium 2 processor takes a next-generation approach to handling enterprise-critical computing, traditionally served by costly mainframes and RISC-based servers. Its impressive performance is driven by two complete execution cores, each with an independent interface to the system bus. Each core also has its own cache, giving the operating system greater resources to handle multiple CPU-intensive tasks.

Dual-Core Itanium 2 processors also feature up to 24 megabytes of low-latency on-die cache, providing nearly three times the bandwidth to both cores when compared to previous-generation Intel Itanium 2 processors.

Furthermore, Dual-Core Itanium 2 processors use up to 20 percent less power than yesterday's Intel Itanium 2 processors, enabling more than 2.5 times higher performance per watt, and lowering energy requirements while providing a significant performance boost. Simply put, the Dual-Core Itanium 2 processor offers one of the industry's most attractive ratios of clock speed to heat generation, making it an ideal choice to address performance limitations and data center cost concerns.

"The Dual-Core Intel® Itanium® 2 processor will enable even faster and more accurate race car modifications, critical to increasing our competitive edge."

—Elmar Huebner, Manager of IT, Toyota Motorsport



The Dual-Core Itanium 2 processor also delivers dramatic performance improvements over the capabilities of its single-core predecessors, especially for business-critical and analytic workloads. For example, in recent online transaction processing (OLTP) benchmark tests involving equivalent core counts, the Dual-Core Intel Itanium 2 processor 9050 outperformed an earlier, single-core version of the Itanium 2 processor by 136 percent.<sup>1</sup> This means transaction-oriented software for industries such as banking, airlines, supermarkets, and manufacturers can deliver faster results and support greater numbers of concurrent users and transactions, enabling a vital competitive edge in today's online world.

### ***Dual-Core Itanium 2 Processors Yield Impressive Real-World Results***

Adoptions of Dual-Core Itanium 2 processors are going beyond better speeds and feeds to impressive real-world results.

In October, Microsoft Corporation's Worldwide Licensing and Pricing group migrated an 11-dimension Volume License Pricing and Sales data warehouse cube to a pre-release version of Intel's next-generation Dual-Core Intel Itanium 2 processor. The result? Speedups of up to 800 percent on critical queries.<sup>2</sup> Microsoft says that this increased performance is helping the group better understand competitive patterns, maximize revenues, and promote a positive and consistent experience for consumers and distributors. For the full case study, visit the Intel Web site.

Auto racing design testing and modifications at Toyota Motorsport are conducted virtually using intensive computational fluid dynamics (CFD) simulation software to predict the behavior of race cars in real-life conditions and to refine their design accordingly. Toyota was astonished by the results generated by the Dual-Core Intel Itanium 2 architecture in comparison with a single-core Itanium 2 processor. In an environment where the full software stack hadn't been optimized, the benchmarking tests delivered up to 20 percent gains in CFD calculation speeds,<sup>3</sup> a huge benefit during race season when engineers have just two weeks between races to make critical design modifications to the Toyota Formula One car. "The Dual-Core Intel® Itanium® 2 processor will enable even faster and more accurate race car modifications, critical to increasing our competitive edge," said Elmar Huebner, Manager of IT for Toyota Motorsport. Read more at the Intel Web site.

#### **High Availability for 70 of the World's 100 Largest Companies**

Dual-Core Intel® Itanium® 2 processors support mainframe-class levels of reliability, up to as high as seven-nines availability (99.99999 percent uptime) for certain system configurations and operating environments. As companies worldwide move toward a real-time computing model for core business applications, Itanium processor-based solutions provide a cost-effective way to meet rising requirements, with enterprise-class solutions that are more flexible, affordable, and widely supported than those based on proprietary RISC and mainframe architectures. This industry-standard reliability has made Itanium 2 the processor of choice for 70 of the world's 100 largest companies,<sup>5</sup> including:

- 9 of the top 10 automotive companies
- 8 of the top 10 banking companies
- 14 of the top 15 energy companies
- 4 of the top 5 healthcare companies

### ***On-Silicon Virtualized Server Support Leverages Existing Investments***

With Intel® Virtualization Technology, new Dual-Core Itanium 2 processors are highly supportive of virtualized server environments, helping IT consolidate more applications onto fewer servers and increase asset utilization, dependability, and return on IT investments. This built-in silicon support makes virtualization with today's leading virtualization software solutions more dependable, interoperable, and supportable.



## ***New Reliability Features Designed to Help Protect Enterprise Uptime***

A number of unique features integrated into the Dual-Core Itanium 2 processors are designed to support best-in-class data center reliability.

Intel® Cache Safe Technology enables high-end systems to operate even in the event of L3 cache errors. And Enhanced Machine Check Architecture provides extensive error detection and correction capabilities to detect bit-level errors, manage data corruption, and help ensure maximum system uptime.

Features such as faster data encryption, robust memory compartmentalization via enhanced paging architecture, and hardware authentication of firmware further contribute to mainframe-class reliability at mainstream prices. (See the sidebar, “High Availability for 70 of the World’s 100 Largest Companies.”)

### **The Best of Both Worlds**

Experience and skills with today’s standards-based, general-purpose Intel® Xeon® processor-based systems translate easily to Dual-Core Intel® Itanium® 2 processor-based environments, even though Itanium 2 processors use a different architecture.

The two architectures even work well together. Many enterprises have chosen Intel Xeon processor-based systems for workloads, such as Web transactions, that can be split into smaller components and reassembled. Those same enterprises use Dual-Core Intel Itanium 2 processor-based servers for data-intensive, business-critical workloads that can take full advantage of large memory and the enhanced parallel-processing power of Itanium 2 processors. Some are choosing to host database-tier applications on Dual-Core Itanium 2 processor-based servers while using Intel Xeon processor-based servers for the application tier.

For more information, see the white paper titled “Itanium® 2-based Solutions and the x86 Architecture,” at the Itanium Solutions Alliance Web site.

## ***Extensive Support Increases Business Agility***

Proprietary mainframes and RISC-based servers are costly and typically supported only by a single vendor, leaving IT departments with few options in terms of choosing related hardware, applications, and operating systems. This not only raises costs but limits the ability to control risk and take advantage of offerings by the broader industry ecosystem. In contrast, servers based on Dual-Core Itanium 2 processors can tap into an extensive universe of flexible and affordable services and software, including many industry-specific vertical products.

For example, servers based on Dual-Core Itanium 2 processors are available from many system vendors, including leading worldwide OEMs such as Bull, HP, Hitachi, Fujitsu, Fujitsu-Siemens, NEC, SGI, and Unisys. Each supports a wide array of operating systems and software including enterprise resource planning, customer relationship management, and high-performance computing applications. In fact, the number of applications optimized for Itanium 2 processors has more than doubled in the past 12 months to more than 8,000. This extensive flexibility to choose from a vast breadth and depth of software that is optimized for Itanium processors and is supported by a broad selection of global vendors helps IT react more quickly and effectively while delivering cost-effective solutions to help address business needs.



## **Smooth Migration Paths Minimize Disruptions**

Businesses are migrating to Itanium processor-based servers with relative ease and very little disruption to ongoing operations, according to an extensive survey by IDC.<sup>4</sup> Support for multiple operating systems means that IT departments can fully use the expertise within their organizations and experience short learning curves. Software vendors that support Itanium 2 processor-based systems can also help simplify migrations and reduce risk.

The extensive support for Intel Itanium 2 processors provides another significant incentive for enterprises running proprietary mainframe- and RISC-based systems to switch. By migrating mainframe and RISC applications to Dual-Core Itanium 2 processor-based servers, organizations can improve performance, reduce costs, and establish a more standardized operating environment across enterprise-critical and mainstream applications. Businesses can also take advantage of the enormous pool of engineers and technicians with expertise in systems based on Intel-based technology, reducing the need for niche training or difficult-to-find specialists.

## **Summary**

Today's business environment requires a reliable computing infrastructure that can scale quickly and efficiently to handle new technologies and growing business needs. Dual-Core Itanium 2 processor-based systems were designed to meet those demands and provide the reliability, performance, and massive scalability<sup>6</sup> needed by both business and technical computing applications.

Dual-Core Itanium 2 processor-based systems are also significantly more energy-efficient than their predecessors, especially compared to mainframes and RISC-based servers. That means enterprises can increase computing capacity in data centers without making significant investments in larger cooling and power systems.

After a US\$10 billion commitment in Itanium processor-based systems by Intel and supporting vendors who are part of the Itanium Solutions Alliance, enterprises can be confident that switching to Dual-Core Itanium 2 processor-based servers will provide the flexibility, long-term support, and application innovation to help speed an investment payback and deliver incremental future returns.

## **More Info**

For more information on new Dual-Core Intel Itanium 2 processors, visit the Intel Web site.

You can also learn more by exploring the Itanium Solutions Alliance Web site.

## **Author Bio**

### **Robert Shiveley, Enterprise Solutions Manager, Solutions Market Development Group, Intel Corporation**

Robert Shiveley, enterprise solutions manager, Intel Corporation, directs IT business value and platform transition strategies for Intel's server platform customers. Shiveley has worked in several enterprise solution strategy roles in his eight years at Intel and is focused on helping business and IT managers maximize the value of Intel-based technologies to enable lower cost and higher growth capabilities for businesses and high-output organizations. Shiveley graduated from California State University at Fullerton with a degree in accounting and business and received his M.B.A. in strategic marketing and operations from Brigham Young University. His career includes auditing and consulting positions with Deloitte & Touche; auditing, finance, and IT with SmithKline Beckman and Beckman-Coulter; and marketing and sales positions with WordPerfect Corp. and Novell, Inc. He is a licensed CPA.



## Notes

<sup>1</sup> Performance claim based on TPC-H publication. [www.tpc.org](http://www.tpc.org): Intel® Itanium® 2 processor, result of 14203 QphH@1000GB, US\$97.18 per QphH@1000GB, on NEC Express5800/1320Xe (16 SMP), using Intel® Itanium® 2 1.6 GHz with 9MB L3 cache, (16 processors/16 cores/16 threads), 128GB memory, Microsoft Windows Server\* 2003, Datacenter Edition (64-bit), SQL Server\* 2005, result published July 2005. Intel Itanium 2 processor, result of 33,488.1 QphH@1000GB, US\$27.00 per QphH@1000GB, on HP rx8640, using Intel Itanium 2 1.6 GHz with 24MB L3 cache, (16 processors/32 cores/64 threads), 128GB memory, Microsoft Windows Server 2003, Datacenter Edition (64-bit) OS, SQL Server 2005, result published on July 18, 2006.

<sup>2</sup> The original server used Intel® Itanium® 2 processors at 1.3 GHz and was configured with 9MB of L3 cache. The new server used Dual-Core Intel Itanium 2 processors at 1.3 GHz with 24MB of L3 cache. Both configurations used 32GB of RAM. Performance claim based on Microsoft testing.

<sup>3</sup> Toyota benchmarking testing details available at [www.intel.com/business/casestudies/toyota\\_motorsport.pdf](http://www.intel.com/business/casestudies/toyota_motorsport.pdf). Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel® products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, reference [www.intel.com/performance/resources/benchmark\\_limitations.htm](http://www.intel.com/performance/resources/benchmark_limitations.htm).

<sup>4</sup> IDC White Paper sponsored by HP, “End-Users’ Feedback: Transform IT and Increase Business Performance Through Itanium-Based Standardization,” August 2005.

<sup>5</sup> Intel White Paper, “The End of the Proprietary Era,” June 2006.

<sup>6</sup> The Intel® Itanium® Architecture was specifically designed to support SMP scalability up to 512 processors, clusters of more than 10,000 processors, and up to 128 terabytes of globally shared memory. For more information, visit [www.intel.com/go/itanium](http://www.intel.com/go/itanium).

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